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Performance Analysis of Balinese Kulkul Beats Information System Based on Website and Android using ISO 9126

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***Abstract*—Bali is known for its tourism and culture, the most viscous Balinese culture to date is consultation or cooperation. This can be seen from the many upakara (ceremonial) activities involving local communities, such as upakara dewa yadnya, manusia yadnya, and bhuta yadnya. In providing ceremonial information in an area in Bali, involving banjar or kulkul users. Kulkul in Bali is a traditional information medium that is still used to convey information about death, deliberation, and disaster in an area. However, people who live outside the village cannot hear information through the sound of kulkul. In this study, the Android-based Kulkul Beats Website and Information System was pre-built, but it is necessary to perform analysis of its performance testing. The system can provide information about the beat of the kulkul and is able to control the kulkul through the android app. It can also provide information about beats and will be displayed on the website, as well as controlling the kulkul through the android app. Android system testing using black box testing. From ISO 9126 test results, the functionality aspect gets a value of 1, where the function test has run 100% correctly. Test results of 100% reliability aspect test with success results. Usability test results showed 65.9% (good) results with Alpha Cronbach 0.969 (excellent). The efficiency aspect test results got a C with an average score of 77.2 and an average load time of 1.44 seconds.**

Keywords—bali, kulkul, ISO 9126, web, android, information systems

I. INTRODUCTION

Bali is one of the provinces in Indonesia, which is closely related to its culture, the cultures in Bali include religious ceremonies, humanity, and so on in an area. In the Banjar the Cekik Tabanan Selemadeg is one of the Banjar that utilizes Kulkul as a piece of media information, there are 3 types of Kulkul beats that are often sounded in the Banjar service of Cekik is the knock Kulkul Pancabaya or which is often referred to in Balinese language beats Kulkul bulus, Kulkul beats deliberation, and the beat Kulkul of death. Kulkul is a very important role for the village that is to convey information to the whole community[1], one of them in the Banjar Ministry of the Cekik Tabanan Selemadeg.

The development of technology today is very fast, especially mobile technology and websites, such mobile devices include smartphones and tablets. Technological development is one of the media that can provide a variety of information. One of them is about tradition or activity in an area. In Banjar Cekik Tabanan Selemadeg information notification process about traditions and activities is required for the community by the village. Information includes information about deaths, village deliberation meetings, and disasters. In general, its spread is obtained through traditional media namely Kulkul in the village. However, there is a problem where the residents of Banjar Cekik Tabanan Selemadeg who live outside the village do not know information about death, deliberation, and disaster directly. This is because the sound of Kulkul's voice does not reach residents outside the traditional village area of Cekik. In addition, in order to sound the customary kulkul must climb bale / kulkul place to sound Kulkul, in the case of a customary emergency must provide information quickly, but when the customary law is not in banjar cekik tabanan selemadeg information to be given to the community will be delayed.

So in this study was created a system that can provide information about the beat of Kulkul and able to control the Kulkul through Android application. This system can later provide information about the beats and will be displayed on the website, as well as controlling the Kulkul through Android applications, so that the customary Kelian the office of Cekik no longer need to climb the bale Kulkul to ring the Kulkul The. From the results of information sent through the automatic Kulkul control device that has been installed on the Bale Banjar in the village and received through the website. But in the making of this information system requires an interface to display information from each tap of the Kulkul and tested using the ISO 9126[2] standard.

II. RESEARCH METHOD

The study method used is the analysis of ISO 1926 with the instrument of the Web-QEM (Website Quality Evaluation Method) where there are four aspects of quality [3] that will be tested functionality, reliability, usability, and efficiency [4].

a. Functionality is a test that is used to determine the functionality of the software[5], the functionality of a software can be calculated using the following formula:

$$X = 1 - \frac{A}{B} \quad (1)$$

Description:
X = Functionality
A = Number of failed test functions
B = Total number of functions

The test is done by filling out a questionnaire containing all the functions located in the software. The questionnaire

will be filled out by 3 respondents who understand the functionality of the software[6]. In this questionnaire will be briefly explained about the function of the software, then 3 respondents filled a questionnaire based on the results that were get based on the functionality of the software. In this questionnaire, there are two options of answers: Whether the function is running correctly (yes) or not (NO). The questionnaire used to test the functionality aspects can be seen in Table I.

TABLE I. QUESTIONNAIRE FUNCTIONALITY

No	Function	Statement	Correct	Incorrect
1	Displaying total information	The function to display the total information is already running correctly		
2	Show kulkul death Information	The function to display the information the Kulkul of death is running correctly		
3	Show kulkul deliberation Information	Function to display the information of Kulkul deliberation already running correctly		
4	Show kulkul pancabaya Information	Function to display the information of Kulkul Pancabaya already running correctly		
5	Show the number of Kulkul by year on chart	Function to display Kulkul information based on year on chart already running correctly		
6	Featured Maps	The function to show maps is already running correctly		

b. Reliability is a software test by using stress testing. Stress testing can be done with a variety of software/tools, such as Web Application Load, Stress and Performance Testing (WAPT) [2]. In order for the software to be able to qualify if the software can run at least 95% good when stress testing is done

c. Usability is a aspect of the ability of a software to be understood, learned, used, and attractive to users when used under certain conditions. Usability testing is aimed at the installation of GUI (Graphical User Interface) which is good and easy to make by users[7]. In order to know the software is easy to learn and understand by users can be used questionnaire[8]. Testing on this aspect was done using use Questionnaire and 10 respondents. In this test there are 5 options of answers that were Strongly Agree (SA), Agree (A), Not Agree (NA), Disagree (D), and Strongly Disagree (SD) Use Questionnaire shown in the Picture Table II.

Each answer has its own score in order to later the score can be analytic. From these scores can be calculated the average number of responses a respondent has given to determine the level of consent for the usability aspect. In this test there are 5 answer options[9], here is the scoring for each answer:

a. Strongly Agree (SA) = 5
b. Agree (A) = 4
c. Not Agree (NA) = 3
d. Disagree (D) = 2
e. Strongly Disagree (SD) = 1

TABLE II. QUESTIONNAIRE USABILITY

No	Statement	Answer				
		SA	*A*	*NA*	*D*	*SD*
1	This Software helps me get information about the beats of Kulkul					
2	This Software helps me get information about the circumstances or activities that often occur in my village					
3	This Software is easy to use					
4	This Software is very useful					
5	This Software is easy to understand					
6	Flexible Software					
7	There is no difficulty in using this software					
8	I learned to use the software quickly					
9	This Software is easy to learn how to use					
10	This Software can help the people of Banjar service Cekik					
11	This Software makes it easier for me to get information about disasters or calamities in my village					
12	I can use this software without written guidance					
13	This Software helps me to know the activities that occur every day, month, or year					
14	This Software makes it easier for me to get information about death in my village					
15	I do not see any damage when using this software					
16	I am comfortable using this software					
17	I learned to use this software quickly					
18	This Software is very interesting					
19	This Software is very useful					
20	This Software makes it easier for me to get information about the deliberations in my village					

Each answer is used in the analysis by calculating the average of each answer based on the score value of each

respondent's answer. Based on the score given in each of the answers above, the calculation can be done as follows:

A = number of scores answering SA = Total answers SA x 5
B = number of score answered A = Total answer A x 4
C = number of score answered NA = Total answer NA x 3
D = number of score answered D = Total answer D x 2
E = number of score Answering SD = Total answer SD x 1

The total score number of answers = A + B + C + D + E

To get the percentage result of the answer questionnaire can use the following formula:

$$\text{Percentage Total Score} = \frac{Total\ Score}{Maximum\ Score}\ x\ 100\% \qquad (2)$$

Where the maximum score value can be obtained with the following formula:

Maximum score = number of respondents x number of questions X 5, in addition it needs to be calculated to know the reliability level of instrument USE Questionnaire by using Alpha Cronbatch calculation. To facilitate the calculation of reusability, used SPSS (Statistical Product and Service Solutions) software. The result of such calculations, compared with the interpretation of the reusability value of the Cronbach Alpha in Table III:

TABLE III. ALPHA CRONBACH INTERPRETATION

Alpha Cronbach	Interpretation
α ≥ .9	Excellent
.9 > α ≥ .8	Good
.8 > α ≥ .7	Acceptable
.7 > α ≥ .6	Questionable
.6 > α ≥ .5	Poor
.5 > α	Unacceptable

d. *Efficiency* is a aspect of the ability of a software to provide appropriate performance, relative to the resources used. The resource referred to in this test is how the software if there is more than one user using the software. In this test can use a tool one of them is YSlow [2]. This Tool works by analyzing a webpage and analyzing the cause of the relationship that occurs, in addition YSlow can provide information on how to improve it [10].

III. RESULTS AND DISCUSSION

A. *Functionality*

Testing functionality using 3 respondents who worked as a programmer and learned about the functions of the software. The functions of such software should be thoroughly tested by respondents who understand the software. The results of the functionality testing are shown in the following Table IV.

TABLE IV. TEST RESULTS OF FUNCTIONALITY

Number Of Statements	Agree	Dissagree
1	3	0
2	3	0
3	3	0
4	3	0
5	3	0
6	3	0
Total	18	0

With the provision of functionality a software will be better when approaching a value of 1 (0 < = X < = 1), then the functionality of the information system of the beats of Kulkul based website and Android is well expressed.

1) Reliability

In the reliability test is stress testing using WAPT 9.7 software with scenario 20 VUs (Virtual Users) in 10 minutes. Software can test stress testing to measure several sessions, pages, and hits categories. The results of the reability test are shown in Figure 1 and in the following Table V.

Summary

Profile	Successful sessions	Failed sessions	Successful pages	Failed pages	Successful hits	Failed hits	Other errors	Total KBytes sent	Total KBytes received	Avg response time, sec (with page elements)
Stress test	290	0	619	0	619	0	0	260	613	0.18(0.18)

Number of active users

Profile	0:00:00 - 0:00:16	0:00:16 - 0:00:36	0:00:36 - 0:00:52	0:00:52 - 0:01:12	0:01:12 - 0:01:28	0:01:28 - 0:01:48	0:01:48 - 0:02:04	0:02:04 - 0:02:24	0:02:24 - 0:02:40	0:02:40 - 0:03:00
Stress test	2	6	10	14	16	20	20	20	20	20
Total	2	6	10	14	16	20	20	20	20	20

Successful sessions (Failed sessions)

Profile	0:00:00 - 0:00:16	0:00:16 - 0:00:36	0:00:36 - 0:00:52	0:00:52 - 0:01:12	0:01:12 - 0:01:28	0:01:28 - 0:01:48	0:01:48 - 0:02:04	0:02:04 - 0:02:24	0:02:24 - 0:02:40	0:02:40 - 0:03:00	Total
Stress test	1(0)	6(0)	16(0)	26(0)	26(0)	45(0)	36(0)	47(0)	40(0)	47(0)	290(0)
Total	1(0)	6(0)	16(0)	26(0)	26(0)	45(0)	36(0)	47(0)	40(0)	47(0)	290(0)

Successful pages (Failed pages)

Profile	0:00:00 - 0:00:16	0:00:16 - 0:00:36	0:00:36 - 0:00:52	0:00:52 - 0:01:12	0:01:12 - 0:01:28	0:01:28 - 0:01:48	0:01:48 - 0:02:04	0:02:04 - 0:02:24	0:02:24 - 0:02:40	0:02:40 - 0:03:00	Total
Stress test	6(0)	20(0)	40(0)	60(0)	54(0)	95(0)	77(0)	92(0)	80(0)	95(0)	619(0)
Total	6(0)	20(0)	40(0)	60(0)	54(0)	95(0)	77(0)	92(0)	80(0)	95(0)	619(0)

Successful hits (Failed hits)

Profile	0:00:00 - 0:00:16	0:00:16 - 0:00:36	0:00:36 - 0:00:52	0:00:52 - 0:01:12	0:01:12 - 0:01:28	0:01:28 - 0:01:48	0:01:48 - 0:02:04	0:02:04 - 0:02:24	0:02:24 - 0:02:40	0:02:40 - 0:03:00	Total
Stress test	6(0)	20(0)	40(0)	60(0)	54(0)	95(0)	77(0)	92(0)	80(0)	95(0)	619(0)
Total	6(0)	20(0)	40(0)	60(0)	54(0)	95(0)	77(0)	92(0)	80(0)	95(0)	619(0)

Fig. 1. Results of sessions, pages, and hits.

Testing of the reliability aspect shows that the success percentage sessions, pages, and hits amounted to 100%, which, according to Telcordia Standard in the results of a percentage of 95%, can be declared qualified or have fulfilled the reliability aspect. The realiability test results can be seen in table 5, the following:

TABLE V. TEST RESULTS OF RELIABILITY

Category	Success	Failed
Sessions	290	0
Pages	619	0
Hits	619	0

2) Usability

Testing usability was done using a USE questionnaire filled by 10 respondents. The result of filling questionnaire is shown in Table VI, as follows.

TABLE VI. TEST RESULTS OF USABILITY

Questions	STS	TS	RG	S	SS
1	0	1	1	8	0
2	1	1	5	3	0
3	0	1	4	5	0
4	0	0	6	4	0
5	0	1	4	5	0
6	0	1	7	2	0
7	0	2	5	3	0
8	0	0	3	7	0
9	0	4	3	2	1
10	1	0	7	2	0
11	0	2	5	2	1
12	0	2	3	4	1
13	0	1	6	3	0
14	0	0	1	9	0
15	0	1	8	1	0
16	0	0	6	3	1
17	0	1	6	3	0
18	0	2	5	2	1
19	0	2	2	6	0
20	1	0	2	7	0
Total	3	22	89	80	5

TABLE VII. RESULT OF USABILITY TESTING CALCULATIONS

Answer	Total	Score	Total x Score
STS	3	1	3
TS	22	2	44
RG	89	3	267
S	80	4	320
SS	5	5	25
Total			659

$$\text{Percentage Total Score} = \frac{Total\ Score}{Maximum\ Score}\ x\ 100\% \qquad (2)$$

Maximum score = number of respondents X number of questions questionnaire X 5
Maximum score = 10 x 20 x 5 = 1000
Total score percentage = 659/1000 x 100% = 65.9%

The percentage of calculation results in get for usability testing is 61.1% and belongs to good.

Description:
0% - 20% = very good
20% - 40% = not good
40% - 60% = enough
60% - 80% = good
80% - 100% = very good

Case Processing Summary

		N	%
Cases	Valid	5	35.7
	Excluded[a]	9	64.3
	Total	14	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.969	20

Fig. 2. Alpha cronbach calculation results.

The Cronbach Alpha value of usability testing in Figure 4 is calculated with SPSS software. From the image above, it can be seen that the value of the Cronbach Alpha is 0.969 with a total of 10 respondents. The value is in conversion to a qualitative scale, where the results are excellent.

3) Eficiency

On the efficiency test using 2 software is Yslow and Page Speed Monitor. YSlow software to know the aspect of a software in providing appropriate performance, relative to the amount of resources used, in predefined conditions. While page speed monitor to know the load time of each page of the website. Website pages are said to be good for users if the website has a 10 second load time.

a. Dashboard Page

Testing efficiency using Yslow for the dashboard page gained grade B with a score of 84. The test results can be seen in Figure 3.

Test result load time for dashboard page using Software page speed monitor, time obtained from testing with this software is 797 Ms. Can be seen in Figure 4.

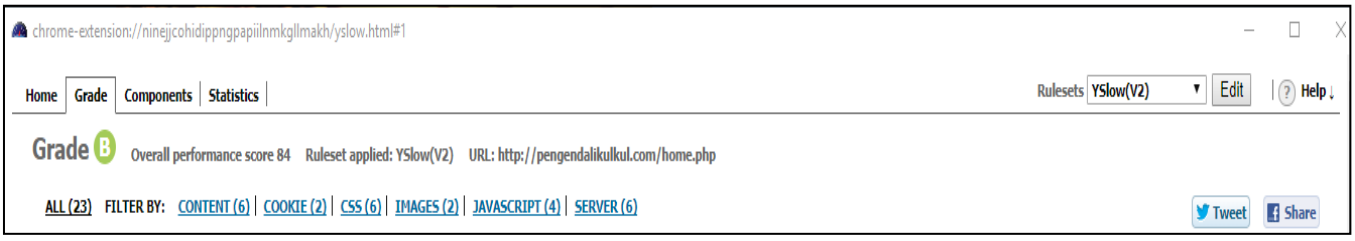

Fig. 3. Yslow test on dashboard page.

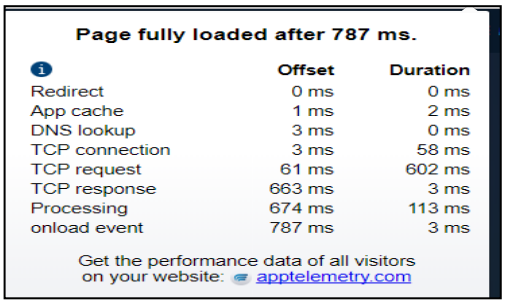

Fig. 4. Load time of dashboard page.

b. Kulkul of Death Page

Test efficiency using the Yslow technique for the death of the dead skin get grade C with a score of 73. Test results can be seen in Figure 5.

Test result load time for dashboard page using Software page speed monitor, time obtained from testing with this software is 1742 Ms. Can be shown in Figure 6.

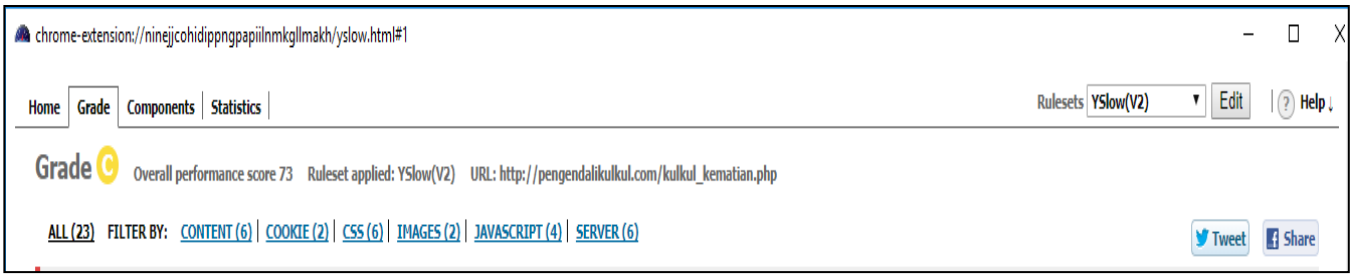

Fig. 5. Yslow test on kulkul of death page.

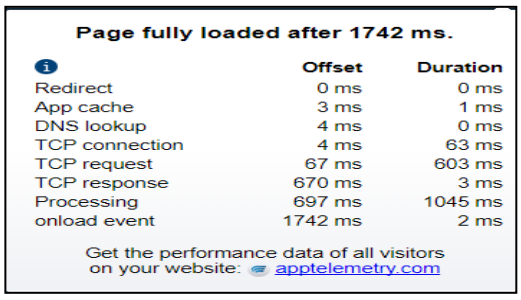

Fig. 6. Load time of kulkul death page.

c. Kulkul Deliberation Page

Testing the efficiency elements using Yslow for the page of the deliberation to get grade C with a score of 73. The test results can be seen in Figure 7.

Test result load time for the page Kulkul deliberation using the Software page Speed monitor, the time obtained from the testing with this software is 1555 Ms. Can be seen in Figure 8.

Fig. 7. Yslow test on kulkul deliberation page.

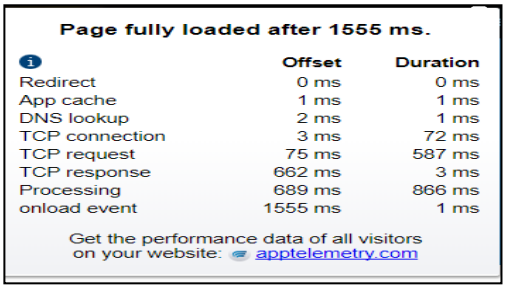

Fig. 8. Load time of kulkul deliberation page.

d. Kulkul Pancabaya Page

The efficiency test using Yslow for the Pancabaya Kulkul page gained a grade C with a score of 73. The test results can be seen in Figure 9.

Test result load time for the page Kulkul Pancabaya using the Software page Speed monitor, the time obtained from the testing with this software is 1557 Ms. Can be seen in Figure 10.

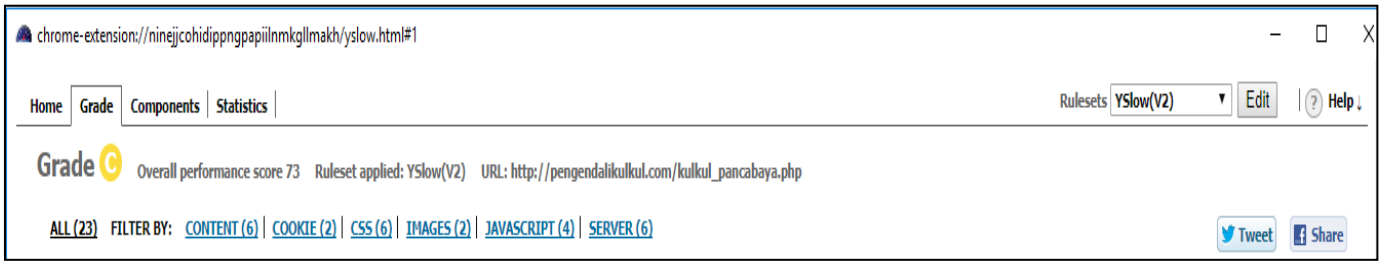

Fig. 9. Yslow test on kulkul pancabaya page.

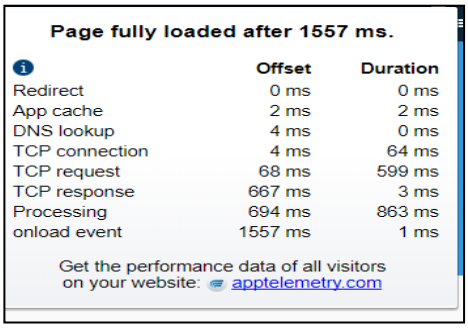

Fig. 10. Load time of kulkul pancabaya page.

e. Village Profile Page

Test efficiency using Yslow for the Village profile page get grade B with a score of 83. Test results can be seen in Figure 11.

Test result load time for the Village profile page using the Software page Speed monitor, the time obtained from the testing with this software is 1596 Ms. Can be seen in Figure 12.

Fig. 11. Yslow test on village profile page.

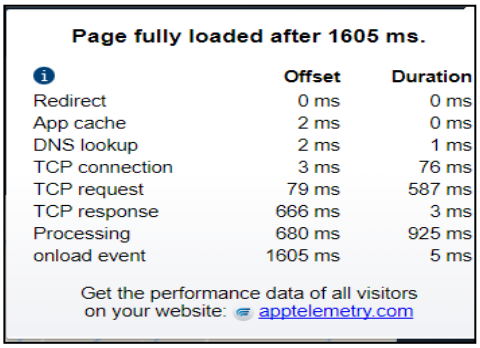

Fig. 12. Load time of village profile page.

TABLE VIII. TEST RESULTS OF EFFICIENCY

No	Page's	HTTP Request	Total Weight (Kb)	Grade	Score	Load Time (ms)
1	Dashboard	14	595.2	B	84	797
2	Kulkul Death	41	732.0	C	73	1742
3	Kulkul Deliberation	41	732.0	C	73	1555
4	Kulkul Pancabaya	41	732.0	C	73	1557
5	Village Profile	14	595.2	B	83	1596
Average				C	386	7247

Based on the results of the efficiency test using YSlow software and Page Speed Monitor can be seen in Table VIII. From the table, it can be concluded that the beat information System Kulkul based website and Android get an average score of 77.2 with grade C. As for the average load time is 1449.4 Ms. Based on the standards of Nielsen, then the load time The average knock-out information System Kulkul website and Android is good. Because in using the Web users will not feel annoyed with the old load time.

CONCLUSION

Overall the system can work fine, it's can be seen from the process when the Android application is sending SMS and received by GSM SIM module 900 and GSM SIM module 900 will send the data on the database and saved on the table. The Data stored in the database will be displayed on the page of the website in tables and graphs. From the test results aspects of functionality got a value of 1, wherein in the test the function has been running 100% correctly. Reliability test result aspects of 100% value with SUCCESS result. The results of usability evaporation get 65.9% (good) results with Alpha Cronbach 0.969 (excellent). The efficiency-aspect test results in a grade C with an average score of 77.2 and a load time average of 1.44 seconds.

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